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DIRECTORATE OF
INTELLIGENCE

Intelligence Report

Communist Purchases of Chemical Plants and Technology from the Free World 1965-66 and Prospects Through 1970

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Foreword

This report focuses on the 1965 and 1966 contracts by the Communist countries for chemical plants (plus equipment and technology) from the Free World, against the background of contracts during 1958-64. It also considers the outlook for contracts through 1970.

Communist contracts with the Free World provide largely for the delivery of complete plants, frequently including the associated technology and technical services. Miscellaneous items of equipment constitute a very small portion of the total value of contracts and, for discussion purposes, are included under the general heading of plants. Because contracts usually are carried out over a period of years, the value of contracts concluded in any one year will not correspond with the value of imports by the Communist countries.

The value figures given throughout the report are in current US dollars and, unless otherwise indicated, refer to contract values.

This report updates information in CIA/RR ER 65-17, Acquisition of Chemical Equipment and Technology by the Communist Countries from the Free World, 1964, July 1965, SECRET

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Contents

Appendix

Tables

[p. iv blank]

Charts

Page

CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence

INTELLIGENCE REPORT

Communist Purchases of Chemical Plants and Technology from the Free World 1965-66 and Prospects Through 1970

Summary

The Communist countries* continued to place large orders for chemical plants and technology with the Free World in 1965-66. Contracts in 1965 amounted to a substantial $313 million and in 1966 rose to $417 million, bringing the total since 1958 to about $2.3 billion - considerably more than for any other type of Western plant and technology. (Purchases before 1958 were relatively small.) The heavy pace of buying is continuing in 1967, and it is estimated that the total value of contracts during 1967-70 will range between $1.2 billion and $2.1 billion, compared with $1.4 billion during the previous four years. Annual purchases by the Communist countries in 1958-66 and estimates through 1970 are shown in Figure 1.

Note: This report was produced by CIA. It was prepared by the Office of Economic Research; the estimates and conclusions represent the best judgment of the Directorate of Intelligence as of September 1967.

* The USSR, the Eastern European Communist countries (Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Rumania), Albania, and the Far Eastern Communist countries (Communist China, North Korea, and North Vietnam).

In achieving their chemical goals for 1970, the Communist countries will be aided substantially by the plants purchased from the Free World in 1965-66 as well as by those purchased in earlier periods but still uncompleted. In Eastern Europe, purchases from the Free World will contribute nearly 50 percent of the increased output planned for chemical fibers in 1970, about 40 percent of that for chemical fertilizers, and about 20 percent of that for plastics. In the USSR, Free World plants will provide about one-fourth of the planned increase in chemical fibers and about one-fifth of that in fertilizers and plastics for 1970. If contracts during 1967-69 reach anticipated levels, Free World facilities will play an even more vital role in Communist chemical programs for 1970.

West Germany and France were the leading sellers of chemical plants and technology in 1965 and 1966, accounting for half of the total value of the contracts. West Germany increased its share of the contracts from 18 percent in 1958-64 to 30 percent in 1965-66. France's share rose from 9 percent in 1958-64 to 20 percent in 1965-66. Most of the remaining contracts in 1965-66 were obtained by the United Kingdom, Italy, Belgium, Japan, and the Netherlands, in that order. US sales during the period were comparatively small despite the acknowledged superiority of most types of US chemical technology and equipment. The United States failed to obtain a larger share of the Communist market for chemical plants partly because of its refusal to guarantee export credits beyond the five-year maximum stipulated by the Bern Union Agreement. Other signatories to the agreement, however, have ignored this provision, and roughly half of the contracts, by value, in 1965-66 involved credits of more than five years.

Background

1. To help provide the chemicals needed for the growth and modernization of agriculture and industry, the Communist countries since 1958 have been buying large amounts of chemical plants and related technology from the Free World. Purchases during 1958-64 totaled about $1.6 billion, considerably more than for any other type of Western technology and equipment. Most of the facilities were for the production of agricultural chemicals (fertilizers and insecticides), synthetic materials (plastics, fibers, and rubber), and basic and intermediate chemicals processed from petroleum and natural gas.

2. With Khrushchev's personal endorsement, the USSR in 1958 launched a program of large-scale purchases of chemical facilities from the Free World. Soviet purchases during 1958-64 amounted to about $0.9 billion, or about 60 percent of the total purchased by Communist countries during the period. Actual imports, as distinct from contracts to purchase, accounted for about one-fifth of the value of all industrial equipment imported from the Free World. Roughly 10 to 15 percent of the fixed productive equipment in the Soviet chemical industry at the outset of 1965 consisted of imports.

3. Until 1964, purchases by the Eastern European Communist countries were small compared with those of the USSR. In that year the value of contracts rose sharply to $166 million, compared with an annual average of about $60 million during 1958-63. The increase was apparently prompted by a growing awareness of the need for advanced chemical plants and technology, by the realization that the USSR and other Communist countries could provide little assistance, and by the enlarged supplies of petroleum and natural gas for use as raw materials in production of chemicals.

4. Communist China's purchases of chemical plants from the Free World began in 1963 and amounted to $76 million for 1963-64. In addition,

China in 1963 contracted with Italy for the purchase of a fertilizer plant to be erected in Albania for $14 million. North Korea's purchases prior to 1965 consisted of only one plant, valued at about $3 million.

Purchases of Plants and Technology in 1965 and 1966

5. After a sharp decline in 1965, Communist purchases of chemical plants and technology from the Free World in 1966 reached some $417 million, approximating the record level attained in 1964. The pattern of purchases in 1965-66, however, differed sharply from that of the earlier period. The USSR, which made 60 percent of the Communist purchases in 1958-64, accounted for only 34 percent ($251 million) in 1965-66. Virtually all of the remaining contracts in 1965-66 (about $450 million) were made by the Eastern European Communist countries. Contracts in 1965-66 by Communist China and North Korea amounted to only $24 million and $5 million, respectively. Figure 2 shows the percentage distributions by country of the total value of Communist purchases of plants, equipment, and technology from the Free World during 1958-64 and 1965-66.

6. As in 1958-64, the chemical plants and technology purchased during 1956-66 were largely for the production of chemical fibers, basic petrochemicals, agricultural chemicals, plastics, and rubber. Other chemical facilities represented less than one-tenth of the total value of contracts in 1965-66. The percentage distribution of purchases by type in 1958-64 and 1965-66 is shown in Figure 3. In line with the emphasis on expansion of the production of petrochemicals, purchases of related plants and technology rose from 18 percent of total chemical plant purchases in 1958-64 to 24 percent in 1965-66. Although chemical fiber facilities continued to comprise the largest proportion of contracts, their share dropped from 31 percent in 1958-64 to 27 percent in 1965-66. Contracts for fertilizer, pesticide, and related plants constituted 17 percent of total

contracts in 1965-66 - slightly less than in 1958-64 (18 percent). Plastics plants retained the same share (14 percent) of the total in 1965-66 as in 1958-64. The Communist countries stepped up their purchases of facilities for tires and other rubber goods, including some equipment for production of synthetic rubber; their share increased from 9 percent in 1958-64 to 11 percent in 1965-66.

7. Soviet purchases of chemical equipment from the Free World in 1965-66 (see Appendix Table 3) averaged $126 million, considerably lower than the record level of $224 million in 1964. The decline reflected the lower priority given chemicals after the departure of Khrushchev and the increased claims by other industries on foreign exchange reserves. As evidence of the decreased emphasis on chemical purchases, the share of chemical plant contracts in total industrial plant purchases from the Free World declined progressively after 1964.

8. Albania did not contract for any chemical installations from the Free World in 1965 or 1966.

9. Bulgaria has been a substantial buyer of chemical facilities from the Free World since late 1963 (see Appendix Table 4). Purchases in 1965-66 amounted to $102 million, bringing the total since 1958 to about $162 million. Most of the contracts in these years were for chemical fiber plants, valued at about $60 million. The remainder consisted predominantly of petrochemical and rubber facilities. The majority of these plants will be situated at the petrochemical center in Burgas.

10. Czechoslovakia's purchases of chemical installations from the Free World in 1965-66 totaled $48 million (see Appendix Table 5), or about the same as during the entire period 1958-64. The stepped-up rate of buying stemmed largely from growing demands for petrochemical plants and technology. The importance attached to Western chemical facilities is attested to by the fact that such purchases accounted for about two-thirds of the total value of industrial installations contracted for from the Free World during 1965-66.

11. East Germany, like Czechoslovakia, is a large manufacturer of chemical equipment and has limited its purchases of chemical plants from the Free World to types incorporating advanced technology. The main emphasis in 1965 and 1966 was on acquiring petrochemical plants related to the production of chemical fibers, plastics, fertilizers, and herbicides. The value of contracts signed in this two-year period was about $28 million, which brought the amount during 1958-66 to $91 million, or 4 percent of the Communist total (see Appendix Table 6).

12. Hungary has been one of the smallest Communist purchasers of chemical plant and technology from the Free World. Contracts in 1958-64 ($36 million) and 1965-66 ($17 million) constituted only 2 percent of the combined value of such transactions by the Communist countries in those years (see Appendix Table 7). Nonetheless, chemical facilities made up a large share of Hungary's purchases of industrial plants from the West in 1965-66. The major chemical purchase in this period was a $12 million polyethylene plastics plant from the United Kingdom in 1965.

13. Poland cut back its Free World purchases from a record $50 million in 1964 to about $16 million in 1965 and $18 million in 1966 (see Appendix Table 8). Although it accounted for only about 5 percent of total Communist purchases in 1965-66, Poland ranked fourth among the Communist buyers of Western chemical plants and technology during 1958-66, with total purchases of about $150 million. Important acquisitions during 1965-66 included an ethylene-propylene facility from West Germany and technology from the United States for the production of butadiene for synthetic rubber, both of which will be used to expand the large petrochemical center at Plock. An interesting contract with Switzerland in 1966 calls for joint efforts in process development for and erection of a maleic anhydride plant in Poland. Although it is not clear whether the Swiss firm will share in the output of the plant, the agreement does call for joint ownership of the patent rights to the

process and for the division of proceeds from the sale of these rights to other countries. This type of arrangement, whereby Poland gains chemical know-how and equipment from the West and shares in sales to third countries, offers obvious advantages to the Poles and could presage similar contracts of this kind.

14. Rumania's purchases of chemical facilities from the Free World jumped from a scant $3 million in 1965 to $216 million in 1966, or more than half of the Communist total (see Appendix Table 9). The sharp upsurge in 1966 was largely a matter of coincidence, in that negotiations were completed which had been under way for some time. Contracts in 1958-64 amounted to slightly more than $200 million, or 13 percent of the Communist total during the period.

15. Communist China, following an initial surge of buying in 1963-64, drastically curtailed its acquisitions of chemical plants from the Free World, which amounted to only $24 million in 1965-66 (see Appendix Table 10). For the entire period 1958-66, purchases totaled about $100 million.

16. North Korea's purchases from the Free World have been limited primarily to fertilizer facilities. The value of contracts amounted to $2 million in 1965 and slightly more than $3 million in 1966 (see Appendix Table 11); prior contracts totaled only about $3 million.

17. North Vietnam made no contracts for Free World chemical plants during 1965-66 and few or no purchases earlier.

Significance of Purchases

18. The sizable purchases of chemical plants and technology from the Free World in 1965 and 1966 will substantially aid the growth and modernization of the chemical industries of the Communist countries. Table 1 shows the extent to which these facilities will contribute to the increased output planned for selected sectors of the chemical

industries of the USSR and Eastern Europe. Such purchases will make a large contribution to the goals for increased output of chemical fibers in all but two of the Communist countries listed in Table 1. The two exceptions - East Germany and the USSR - have contracted for facilities that indirectly will support the increased output of

Table 1

USSR and Eastern Europe:
Contribution of Free World Plants
Purchased in 1965-66 to Planned Increases in Output
of Selected Chemicals a/
1966-70

Percent of Planned Increases

Country	Sectors of Chemical Industry			
	Chemical Fibers	Plastics	Fertilizer	Synthetic Rubber
USSR	0	8.5	11	7
Eastern Europe	35	17	11	N.A.
Bulgaria	86	0	0	N.A.
Czechoslovakia	29	0	0	0
East Germany	0	0	0	0
Hungary	50	66	0	0
Poland	33	0	8	0
Rumania	41	56	35	0

a. It is assumed that these facilities will be completed and producing at designed capacity by 1970. Because of insufficient data, the Far Eastern Communist countries are not included.

chemical fibers through production of fiber raw materials and intermediates. Plastics, fertilizers, and rubber are other major sectors that will benefit from the Free World facilities purchased in 1965-66. Rumania, which bought 30 percent of the total, has placed the greatest reliance on Free World plants

for achieving its long-term goals; plants contracted for in 1965-66 will provide 56 percent of the scheduled increase in output of plastics by 1970, 41 percent of the increase in chemical fibers, and 35 percent of the planned gain in chemical fertilizers.

19. In addition to the plants purchased in 1965-66, a number of facilities bought in earlier years and still uncompleted in 1966 will contribute to Communist goals for increased chemical output by 1970. In the case of the USSR these earlier purchases together with those in 1965-66 will provide about one-fourth of the planned increase in chemical fibers and about one-fifth of the scheduled gain in fertilizers and plastics for 1970. In Eastern Europe the backlog of uncompleted plants acquired from the Free World, including those purchased in 1965-66, will contribute nearly half of the planned increase in output of chemical fibers by 1970, approximately 40 percent of the scheduled gain in fertilizers, and about 20 percent of that in plastics. If contracting for additional plants proceeds as expected during 1967-69, the contribution of Free World facilities to the fulfillment of chemical plans for 1970 will be even greater than that indicated in Table 1.

Sellers and Terms of Payment

20. Seven Free World countries accounted for over 90 percent of the $2.3 billion in sales of chemical plants and technology to the Communist countries during 1958-66. The percentage distribution of these sales in 1958-64 and 1965-66 is shown in Figure 4. In 1965-66, West Germany and France dominated sales by the Free World, accounting for half of the total value during the period. West Germany's share of total Free World sales rose from 18 percent in 1958-64 to 30 percent in 1965-66. Sales by France increased from 9 percent of the total in 1958-64 to 20 percent in 1965-66. By contrast, the United Kingdom secured about 37 percent of the sales in 1958-64 but only 12 percent in 1965-66. The United Kingdom, however, remains the largest seller with contracts

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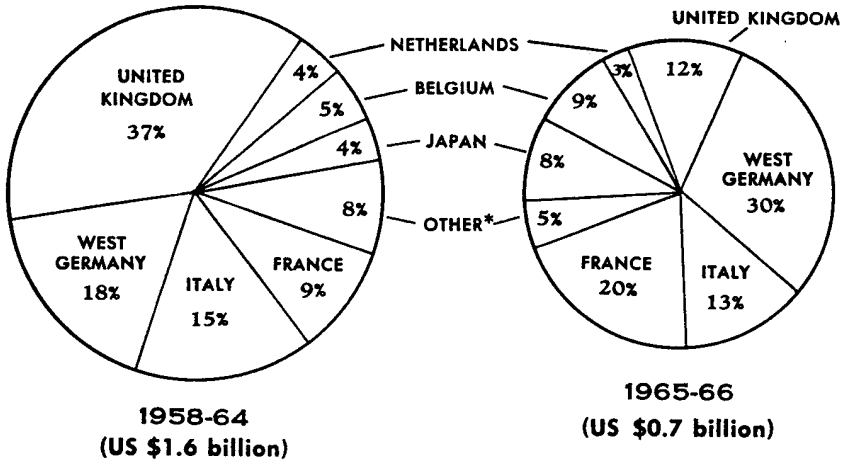
Figure 4

FREE WORLD: PERCENTAGE DISTRIBUTION OF CHEMICAL PLANTS AND TECHNOLOGY SOLD TO THE COMMUNIST COUNTRIES, BY VALUE 1958-64 and 1965-66



*Including principally Austria, Denmark, Finland, Sweden, Switzerland, and the United States.

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during 1958-66 amounting to almost $0.7 billion. Other major Free World sellers in 1965-66 were, in order of importance, Italy, Belgium, Japan, and the Netherlands.

21. Contracts generally have called for down-payments of 20 to 25 percent with government-guaranteed credits for the remainder extending over several years. Although the Bern Union Agreement* limits credits to the Communist

* The Bern Union, or Association of International Credit Assurers, is made up of private and public institutions from a number of Free World countries. Members have generally agreed that ordinary export-credit guarantees should [footnote continued on p. 11]

countries to a maximum of five years, most signatories except the United States have ignored this provision. Thus about half of the contracts by value in 1965-66 involved credits ranging from six to nine years. In large purchases, guaranteed credits are for longer periods. For example, the British government guaranteed a 15-year credit to the USSR in 1964 for a large polyester fiber plant valued at $84 million.

22. Adherence by the United States to the five-year limitation on guaranteed credit to the Communist countries has been a factor in preventing US firms from obtaining a larger share of the Communist market for chemical facilities. Despite the acknowledged superiority of US chemical processes and plants, sales to date have been small and have consisted largely of technology provided through firms in other Free World countries where longer term financing is available.

Prospects, 1967-70

23. Recent trends in purchasing and evidence of continuing need suggest that Communist contracts for Free World chemical facilities during 1967-70 will be substantial. Barring major changes in chemical priorities, it is estimated that the Communist countries will purchase about $1.2 billion to $2.1 billion of chemical plants and technology from the Free World, compared with about $1.4 billion in 1963-66. On an annual basis, purchases during 1967-70 are expected to average $310 million to $525 million. Contracts during the first half of 1967 amounted to about $160 million but are expected to be more than double this amount for the whole year. The estimated total and annual average of Communist purchases of chemical plant and technology from the Free World in 1967-70 are given in Table 2.

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be limited to a maximum of five years. Although many countries do not rigidly follow the Union's recommendations, the United States has continued to observe the five-year limitation in the case of credits for Communist countries.

Table 2

Communist Countries:
Estimated Value of Chemical Plants and Technology
Purchased from the Free World
1967-70

Million US $

	Total	Annual Average
USSR	480 to 880	120 to 220
Eastern European Communist countries	700 to 1,100	175 to 275
Far Eastern Communist countries	60 to 120	15 to 30
Total	1,240 to 2,100	310 to 525

24. Purchases by the USSR of Free World chemical facilities probably will average $120 million to $220 million per year during 1967-70.* Although contracts in the first half of 1967 amounted to only $46.5 million, the Soviet authorities were negotiating for 25 more facilities with an estimated value of well over $100 million. Soviet interest currently is centered on obtaining plants for the production of tires and associated products such as synthetic rubber and carbon black. Other negotiations involve facilities for the production

* The Soviet purchases of Free World chemical equipment and technology during 1967-70 were estimated by two procedures which yielded fairly similar results: (1) an estimate of domestic chemical equipment requirements (as implied by planned investment) and an estimate of the amount of this equipment which would be supplied by domestic sources and by imports from Eastern Europe, and (2) an estimate based on a projection of the trend in the ratio of chemical equipment imports from the Free World to chemical investment in the USSR.

of fertilizers and synthetic materials. The United States figures prominently in these negotiations, one of which involves a $50 million polystyrene complex to be paid for in part by Soviet deliveries of products from the plant to the US contracting firm.

25. Average annual purchases during 1967-70 by the Eastern European Communist countries probably will rise to between $175 million and $275 million* from a level of about $170 million during the previous four-year period. In the first half of 1967, contracts amounted to an estimated $115 million, largely because of heavy purchases by Poland worth $85 million. During the remainder of the period the other Eastern European countries may be expected to increase their purchases from the Free World, but it is doubtful that the average annual value of contracts by the Eastern European Communist countries will reach the high level ($290 million) of 1966.

26. Although there is considerable uncertainty regarding the purchases of chemical plants by Communist China and North Korea during 1967-70, total purchases during the period are estimated at $60 million to $120 million. In 1966, China purchased less than $1 million worth of chemical equipment from the Free World, and it is not known to have placed any contracts with Japan or the West during the first half of 1967. Negotiations with Free World countries have covered several areas of chemical technology and equipment, most notably petrochemicals, synthetic rubber, chemical fibers, plastics, and urea fertilizer. Because of China's many requirements for scarce foreign

* This estimate was derived primarily by projecting through 1970 the earlier relationship between plant purchases and chemical investment. Additions were made for plant purchases which East Germany, Czechoslovakia, and Poland probably will make in order to fulfill their commitments to supply the USSR with chemical plants and equipment.

exchange and its reluctance to incur long-term debt, Chinese purchases during 1967-70 probably will not exceed about $100 million. North Korea's purchases of chemical plant and equipment from the Free World are expected to remain small, amounting at most to $20 million during 1967-70.

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Figure 1

COMMUNIST COUNTRIES: CHEMICAL PLANTS AND TECHNOLOGY PURCHASED FROM THE FREE WORLD

1958-66 and 1967-70 (Projected)

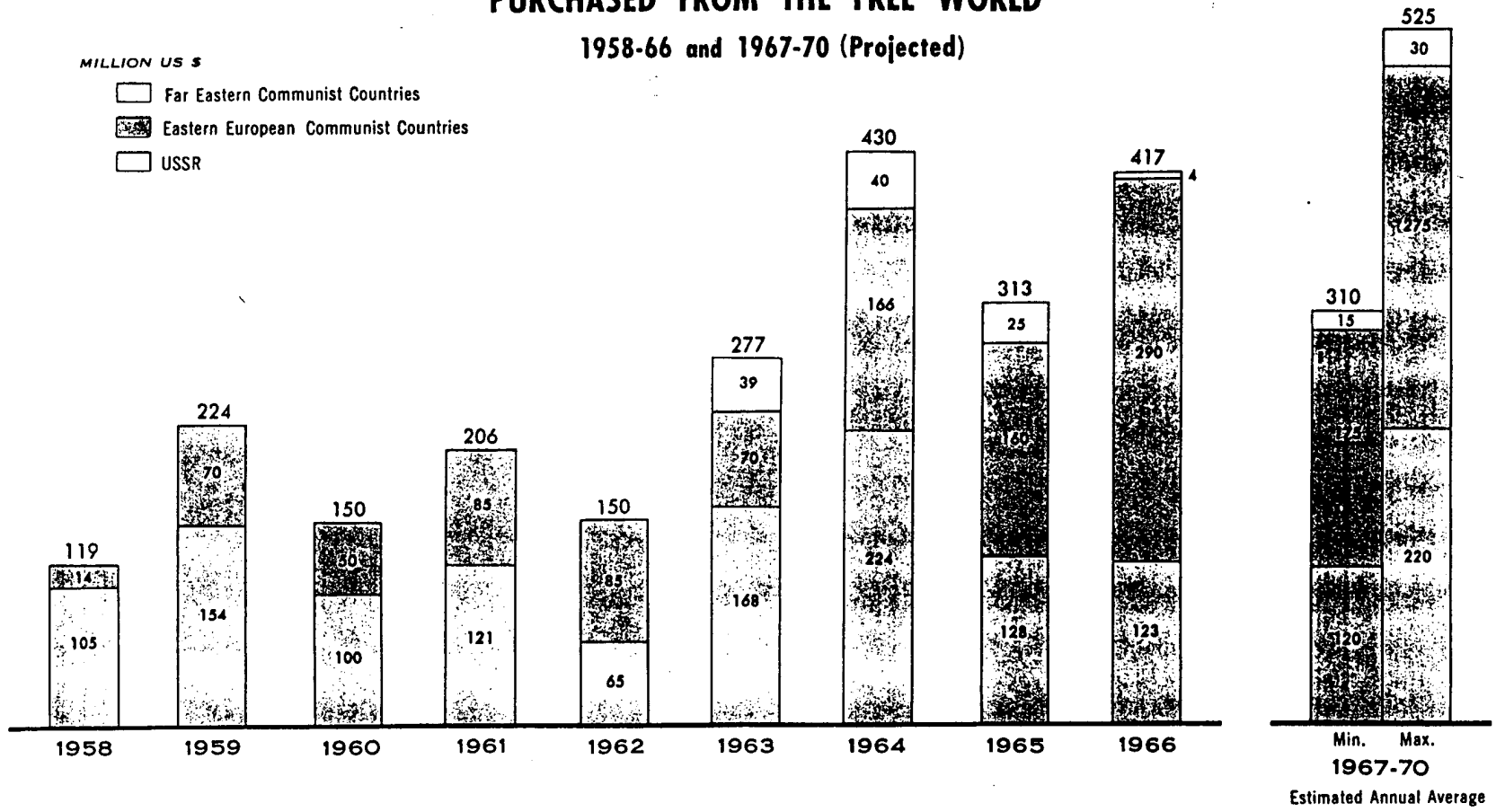

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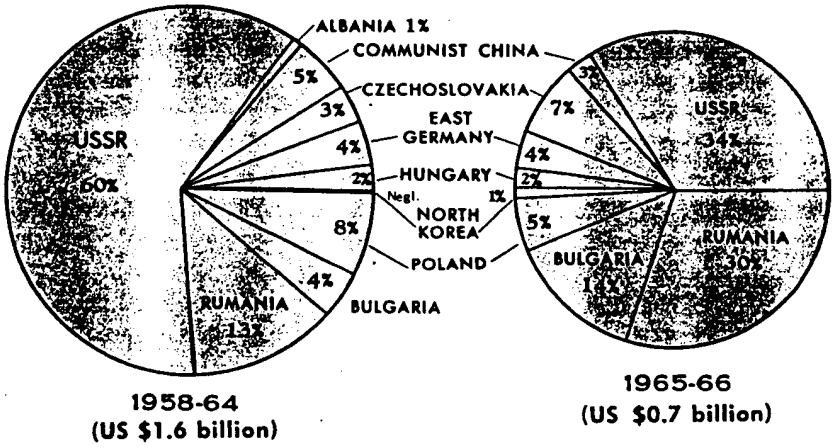
Figure 2

COMMUNIST COUNTRIES: PERCENTAGE DISTRIBUTION OF CHEMICAL PLANTS AND TECHNOLOGY PURCHASED FROM THE FREE WORLD, BY VALUE

1958-64 and 1965-66



1958-64
(US $1.6 billion)

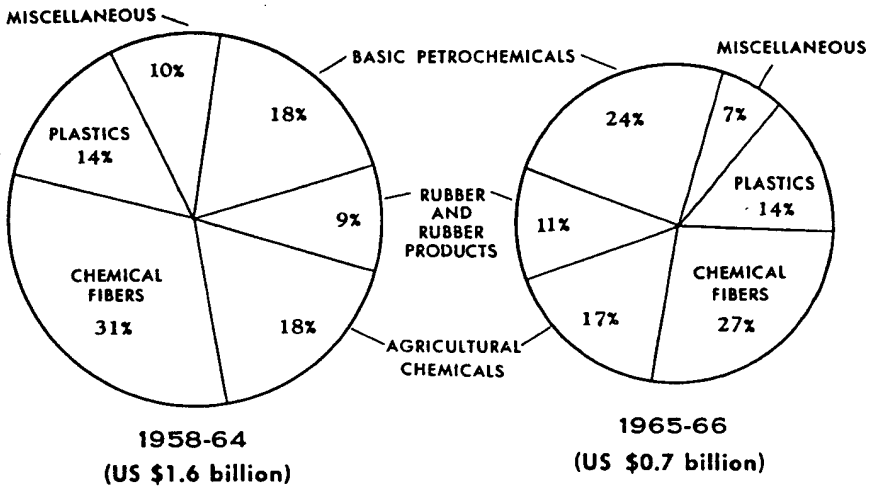
1965-66
(US $0.7 billion)

56980 8-67 CIA

Figure 3

COMMUNIST COUNTRIES*: PERCENTAGE DISTRIBUTION OF CHEMICAL PLANTS AND TECHNOLOGY PURCHASED FROM THE FREE WORLD, BY TYPE

1958-64 and 1965-66



1958-64
(US $1.6 billion)

1965-66
(US $0.7 billion)

*Including the USSR, the Eastern European Communist countries and Albania, and the Far Eastern Communist countries.

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Appendix

Communist Contracts for the Purchase of Chemical Plants and Technology from the Free World, 1965-66

Table 3

USSR: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) [a]	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers and intermediates							
	Acrylonitrile	50	25.0	Japan United States	Asahi Standard Oil	Polotsk	Delivery to be completed in 1967	The technology is to be supplied by Prospect International, the Puerto Rican subsidiary of Standard Oil. The process is based on ammonia and propylene.
	Carbon bisulfide	60	6.9	Italy United States	Snia-Viscosa FMC	Volzhskiy (near Volgograd)	1970 or late 1969	The US is to supply technology, valued at $1.9 million. Carbon bisulfide is to be produced from methane.
	Elastic filaments	N.A.	1.3	Italy	Pirelli	N.A.	N.A.	
	Basic petrochemicals							
	Ammonia	400	23.0	France	ENSA	Cherkassy	1968	Some US technology may be involved. In addition, a US firm probably is to supply pumps and compressors.
	Plastics, plastics processing, and intermediates							
	Artificial leather	N.A.	5.0	Italy	Pirelli	N.A.	N.A.	
	Polyvinyl chloride	60	22.5	France United States	Speichim Stauffer	Dzerzhinsk	1968	US technology is to be used in producing about one-half of the vinyl chloride (from ethylene dichloride). The cost of the US technology reportedly is to be $470,000.

a. Unless otherwise indicated.

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Table 3

USSR: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Agricultural chemicals							
	Complex granulated fertilizers	50	1.7	United Kingdom	Spencer-Weatherly	N.A.	N.A.	US technology is to be used.
	DDT plant	7	0.5 (est.)	Japan	Shinnichi Engineering Co.	N.A.	To have been shipped before May 1966	To produce DDT as 50 percent and 75 percent wettable powder.
	Insecticide plants	N.A.	0.5	United Kingdom	Sturtevant	N.A.	N.A.	3 pilot plants.
	N.P.K. compound fertilizer plant	460	10.0 (est.)	West Germany Netherlands	Didier-Werke Stamicarbon	Tol'yatti	Summer 1967	To use technology from the Netherlands States Mines.
	Potash mining equipment	N.A.	1.4	United States	Joy	Soligorsk	Delivery fall 1965	
	Rubber and rubber products							
	Automobile rubber gaskets	N.A.	9.6	Italy	Pirelli	N.A.	N.A.	
	Latex gloves	8.5 million pairs per year	1.2	Italy	Pirelli	N.A.	N.A.	Gloves for industrial and surgical use.
	Rubber chemical plant	40	2.0	France	Cie Européenne d'Equipement Industriel	N.A.	End of 1967	
	Other chemical equipment							
	Acetylene compressors	13,000 cu m per hour for each of six compressors	1.1	West Germany	Borsig	N.A.	N.A.	
	Caustic soda evaporation equipment	33.25 (est.)	3.5	France	Kestner-Lille	Possibly Sterlitamak	Delivery early 1967	An addition to the plant that was built by the same company in 1961.

Table 3

USSR: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) [a]	Value (Million US $)	Exporter: Country	Exporter: Firm	Plant Site	Scheduled Completion Date	Comments
1965	Other chemical equipment (Continued)							
	Fatty acid	5.0	0.9	West Germany	Ferrostahl Schmidding	N.A.	Delivery 1965-66	
	Organic peroxide	2.35	2.8	United Kingdom	John Brown	Kazan'	1968	A Dutch process is to be used. The plant will provide catalysts for the polyethylene plant at Kazan'.
	Minor chemical equipment contracts		8.7 (est.)					
1966	Chemical fibers and intermediates							
	Elastic thread	N.A.	1.0	Italy	Pirelli	N.A.	N.A.	
	Basic petrochemicals							
	Petrochemical complex including facilities for:							The plant is to use the Solvay process utilizing propylene feedstock. The allyl chloride and epichlorohydrin will be used as raw materials for glycerine. Trichloropropane and dichloropropane will be produced as byproducts.
	Allyl alcohol	1						
	Allyl chloride	26						
	Carbon tetrachloride / Perchloroethylene	20	20.0	France / Italy / Belgium	CMP / CTIP / Sofina	Sterlitamak	N.A.	
	Chlorine drying and compressing plant							
	Epichlorohydrin							
	Glycerine	20						
	Hydrochloric acid	14.45						
	Perchloroethylene	N.A.	2.1 (est.)	Japan	Sumitomo	N.A.	N.A.	
	Plastics, plastics processing, and intermediates							
	Cable sheathing plant	30	3.8	France	Speichim	Dzerzhinsk	Delivery scheduled for 1968-69	To make cable sheathing and hoses from polyvinyl chloride.

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Table 3

USSR: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Plastics, plastics processing, and intermediates (Continued)							
	Melamine	10	6.2	Italy	Monticatini-Edison	Kirovakan	To start production in 3 years	For use in plastics production. Part of the payment by the USSR is to be in raw materials.
	Polyvinyl chloride	60	11.9	Japan	Kureha Fuji Chiyoda	Volgograd	To be in operation by June 1969	The raw material is to be naphtha.
	Recording tapes	N.A.	0.5 (est.)	Belgium	Gevaert-Agfa AG	Ukraine	N.A.	
	Agricultural chemicals							
	Complex fertilizers	600	11.0	France	Speichim	Voskresensk	Delivery to be in 1968	The Pechiney - St. Gobain process will be used.
	Insecticides plant	30	1.7	United Kingdom	Sturtevant	N.A.	Late 1968	Including technology.
	Phosphorus furnaces	41	16.2	West Germany	Uhde Knapsack	Chimkent	1969	Two units.
	Potash equipment	2,000 (est.)	5.8	West Germany	Klockner-Humboldt-Deutz AG	N.A.	N.A.	Four potash granulating units; technology and engineering included.
	Rubber and rubber products							
	Carbon black	N.A.	1.4	Italy	Petrochemical International Instrument Co.	N.A.	N.A.	Pelletizing plant.
	Polyisoprene and polybutadiene equipment	45	15.0 (est.)	France	Severn and Co.	Volgograd	Mid-1967	A US firm is to supply the drying equipment valued at $810,000. A Soviet process will be used.

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Table 3

USSR: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Rubber and rubber products (Continued)							
	Rubber goods plant and rubber mill room	N.A.	11.0	United Kingdom	Simon-Handling	Karaganda	Delivery 1968-69	
	Other chemicals							
	Cyanuric acid	4,500	1.9	Japan	Mitsubishi Kasei Kogyo	Kirovakan	Delivery scheduled for Sep 1968	This plant reportedly will be the largest of its kind in the world.
	Effluent plants	N.A.	5.0	Netherlands United Kingdom	Continental Eng. Balfour	N.A.	N.A.	Two facilities for use at caprolactam plants.
	Emulsion base for photographic equipment	N.A.	0.5 (est.)	Belgium	Gevaert-Agfa AG	Ukraine	N.A.	
	Glass lined equipment	N.A.	1.4	Japan	Shinko-Pfaudler	N.A.	N.A.	
	Pharmaceutical plant	N.A.	3.0	France	Rapidase-Seclin	N.A.	N.A.	To produce amylase and protease.
	Pharmaceutical plant	4,200 ampules per hour	0.7	West Germany	Ohlert	Moscow	N.A.	This plant is to produce endocrine preparations.
	Sodium cyanide	4.4	2.6	Japan	Shinnichi Eng. Co.	N.A.	1968	
	Miscellaneous small purchases		0.5					

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Table 4

Bulgaria: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers and intermediates							
	Dimethyl terephthalate Polyester fiber	12 12	27.6 (est.)	West Germany	Krupp Lurgi	Burgas Yambol	1967	Eight-year credit involved.
	Acrylonitrile	20	15.2	France United States Belgium	ENSA Litwin ECE	Burgas	1968	US process to be used.
	Acrylic fibers	18	17.6	Belgium	ECE	Burgas	1968	
	Basic petrochemicals							
	Aromatic hydrocarbons	21	12.8	Italy	Bonaldi	Burgas	1967	
	Ethylene oxide/glycol	10/9	3.5 (est.)	West Germany Austria	C. Still VOEST	Burgas	1967	
	Paraxylene	9 (est.)	6 (est.)	West Germany	Krupp	Burgas	1967	The output is to be used in production of dimethyl terephthalate to be supplied to the polyester fiber plant at Yambol.
	Plastics and intermediates							
	Polyurethane foam	N.A.	0.5 (est.)	West Germany	Bayer	Ruse	N.A.	Process technology and possibly equipment.
	Agricultural chemicals							
	Urea	N.A.	0.5 (est.)	West Germany	N.A.	Stara Zagora	1965	Part of the equipment for this unit came from West Germany and the remainder from the USSR, East Germany, and Czechoslovakia.

a. Unless otherwise indicated.

Table 4

Bulgaria: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1956-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Rubber products							
	Tires	1.2 million units	15	France	CIFAL	Vidin	1968	The USSR will supply some equipment for this plant.
	Synthetic rubber	N.A.	0.5 (est.)	West Germany	Zimmer	Burgas	1968	Technical aid and possibly some equipment. The major part of this plant reportedly is being provided by the USSR.
	Other chemicals							
	Amino acid	N.A.	3	Japan	Mitsui Shipbuilding Kyowa Hakko	N.A.	N.A.	

SECRET

Table 5

Czechoslovakia: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) [a]	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Basic petrochemicals							
	2-ethyl hexanol Butanol	10 10	6.1	Japan	Mitsubishi	Zaluzi	1969	
	Ethylene oxide/glycol	30/N.A.	10	Italy	SNAM Progetti ENI	Bratislava	1967	
	Rubber products							
	Tires	N.A.	10	West Germany	Krupp	Otrokovice	1970	Tires for passenger cars, trucks, and tractors.
	Other chemicals							
	Furfural	N.A.	1.0 (est.)	Austria	N.A.	Zvolen	N.A.	
1966	Chemical fibers							
	Polyester fibers	6	2.5	West Germany	Vickers-Zimmer	Plana nad Luznici	1967	An Austrian firm and possibly a UK firm will also participate in this contract.
	Basic petrochemicals							
	Synthesis gas Ammonia Methanol	1 billion cu m 340 N.A.	8.3 4.1	Netherlands West Germany	Exportkontoor Vakanof Dr. C. Otto	Zaluzi	1970	The existing coal-based combine will be converted to use petroleum as an input.
	Agricultural chemicals							
	Complex fertilizer	86	0.5 (est.)	France	COCEI	Lovosice	1970	Technology only.

a. Unless otherwise indicated.

Table 5

Czechoslovakia: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Rubber products							
	Tires	N.A.	1.3	Italy	Pirelli	Otrokovice	Probably by 1970	Radial tires.
	Tires	2 million units	4.2	United Kingdom	Simon-Handling	Otrokovice	1970	
	Other chemicals							
	Minor chemical equipment contract		0.4					For plastics processing.

SECRET

Table 6

East Germany: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers and intermediates							
	Acrylonitrile	20	6.1	France United States	Litwin	Schwedt	1968	Technology only.
	Plastics and intermediates							
	Phthalic anhydride	10	1.3	West Germany	Lurgi	Schkopau	N.A.	Ortho-xylene to be used as feedstock.
	Maleic anhydride	2.5	2.0 (est.)	West Germany	Lurgi	Schkopau	1967	Possibly connected with phthalic anhydride contract.
	Agricultural chemicals							
	Herbicides	2	4.5	West Germany	Henschel	Schwarzheide	1967	UK equipment is also included.
	Other chemicals							
	Plastics and rubber processing	N.A.	1.5	France	Repiquet	N.A.	N.A.	
	Minor chemical equipment contracts		1.2					For chlorine liquefaction and plastics processing.
	Chemical fibers and intermediates							
	Acrylonitrile	20	10.4	France	ENSA	Schwedt	N.A.	Connected with a 1965 contract.
	Basic petrochemicals							
	Ammonia	N.A.	1.4	United Kingdom	Humphreys and Glasgow	Schwedt	N.A.	Extension of plant.

Table 7

Hungary: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers							
	Synthetic fiber	N.A.	0.5	West Germany	Zimmer	Nyergesujfalu	N.A.	Spinning equipment is probably for a nylon fiber plant previously equipped by West Germany.
	Plastics							
	Polyethylene	24	11.8	United Kingdom	Simon Carves ICI	Tiszapalkonya	1969	
	Rubber products							
	Rubber products	N.A.	0.5 (est.)	West Germany	MIAG	Budapest	N.A.	Replacement for equipment lost in a fire; may possibly include tire equipment.
1966	Chemical fibers							
	Nylon	3	2.0	West Germany	Industriewerke Karlsruhe K. Fischer Lufttechnische	Nyergesujfalu	N.A.	For expansion of a nylon-6 plant.
	Plastics							
	Polyvinyl chloride	24	1.5	West Germany	MIAG	Kazincbarcika	Delivery early 1967	Expansion of a plant for which West German equipment was provided earlier.
	Other chemicals							
	Steroid compound	N.A.	0.5 (est.)	United States	Smith, Kline, and French	Probably Budapest	N.A.	License and technology.

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Table 8

Poland: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers and intermediates							
	Polyester fiber	N.A.	1.3	United Kingdom	Dobson and Barlow	Torun	N.A.	Drawtwisters for both synthetic fiber plants.
	Nylon fiber	N.A.				Gorzow Wielkopolski		
	Acrylic fiber	N.A.	0.6	United Kingdom	Prinex, Ltd., of Courtaulds, Ltd.	Lodz	N.A.	Additional equipment for a plant previously obtained from the United Kingdom.
	Basic petrochemicals							
	Ethylene/propylene	67/41.5	8.4	West Germany	Linde	Plock	N.A.	
	Butadiene	60	3.2	United States	Houdry	Plock	1969	Technology only.
	Plastics and intermediates							
	Phthalic anhydride	N.A.	0.5 (est.)	United Kingdom	United Coke and Chemical	Oswiecim	N.A.	Design data and catalyst.
	Agricultural chemicals							
	Ammonium nitrate	N.A.	1.5 (est.)	France	Kaltenbach CETEI	Pulawy	N.A.	Kaltenbach is to supply technology; CETEI is to supply a fertilizer-bagging and handling facility.
	Other chemicals							
	Nitrogen	N.A.	1.0 (est.)	United Kingdom	Petrocarbon	Torun	1967	To produce high-purity nitrogen for polyester fiber manufacture.

Table 8

Poland: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Chemical fibers							
	Polyester fibers	N.A.	1.6	United Kingdom	Dobson and Barlow	Torun	N.A.	Drawtwisters for polyester fibers similar to 1965 contract.
	Nylon fiber Nylon filament Nylon tire cord	2 1 14	12	Italy	Snia-Viscosa	Gorzow Wielkopolski	1970	Additions to an existing nylon-6 plant.
	Basic petrochemicals							
	Ammonia	N.A.	0.6	United Kingdom	Simon Carves	Probably Pulawy	N.A.	For ammonia converters; probably an addition to a contract signed in 1964.
	Agricultural chemicals							
	Superphosphate	397	2.2	United Kingdom	Dorr-Oliver	Gdansk	1968	This plant can be converted to produce compound fertilizer. Licensing arrangements are made for future plants.
	Other chemicals							
	Maleic anhydride	N.A.	1.0 (est.)	Switzerland	Imhausen	Kedzierzyn	N.A.	A cooperative Polish-Swiss project.
	Minor chemical equipment contract	N.A.	0.4					For synthetic detergents.

Table 9

Rumania: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Rubber products							
	Industrial products	N.A.	3.4	Italy	Pirelli	Jilava	1968	
1966	Chemical fibers and intermediates							
	Acrylonitrile	20	15.6	France United States	ENSA Badger	Pitesti	1968	
	Polyester fiber	10	17	West Germany	Uhde Hoechst	Iasi	1969	
	Dimethyl terephthalate	14	15	West Germany	Krupp	Brazi	1969	
	Basic petrochemicals							
	2-ethyl hexanol	20	12.5	West Germany	Uhde	Ramnicu Vilcea	1968	
	Ammonia	300	7 (est.)	United Kingdom	N.A.	Turnu Magurele Craiova	1968	Part of a $60 million contract signed with Sybetra of Belgium. For full information, see the entry under Agricultural chemicals.
	Ammonia	100	5	West Germany	Uhde	Targu Mures	1967	An addition to an existing unit.
	Phenol/acetone	25/15	4.5	Italy	SIR	Brazi	1969	
	Para-xylene	18	12.5	West Germany	Krupp	Brazi	1969	Including a xylene isomerization unit.
	Methanol	50	4.5	West Germany	Lurgi	Victoria	N.A.	An addition to an existing unit.
	Ethylene/propylene	100/51	18.4	West Germany	Lurgi	Pitesti	1968	

Table 9

Rumania: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Plastics							
	Polyethylene	48	18.2	United Kingdom	Simon Carves ICI	Pitesti	1969	
	Artificial leather	2.4	0.9	Italy	Aufas	N.A.	N.A.	
	Polyvinyl chloride Vinyl chloride	36 40	10	West Germany	Klockner-Humboldt-Deutz AG	Ramnicu Vilcea	1968	A US firm (Dow) is to supply the technology.
	Polyurethane foam	2	0.5	West Germany	Bayer	Timisoara	1967	The contract includes two units.
	Agricultural chemicals							
	Nitric acid Ammonium nitrate	241 300	6.3	West Germany	Didier Werke	Targu Mures	1968	
	Nitric acid Ammonium nitrate Urea	240 300 300	53.0 (est.)	Belgium France United Kingdom	Sybetra Evence-Coppée-Rust Grand Paroisse Kaltenbach Humphreys and Glasgow	Turnu Magurele Craiova	1968	The main contractor is Sybetra. The total value of the contract is about $60 million and includes one installation of each type, plus one ammonia plant, for both plant sites. The UK firm is to supply the ammonia plants.
	Phosphoric acid Complex fertilizers	60 190	5	Belgium	ERI UCB	Turnu Magurele	N.A.	
	Rubber products							
	Rubber processing	N.A.	0.5 (est.)	West Germany	FIX MIAG	Jilava	1967	Automatic measuring and mixing equipment.
	Molded products	N.A.	2.2	Italy	Pirelli	N.A.	N.A.	Possibly connected with a 1965 contract; may include tire equipment.

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Table 9

Rumania: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1966	Other chemicals							
	Organic chemicals for pharmaceuticals	N.A.	0.5 (est.)	France	Petrole Chimie	N.A.	N.A.	
	Caustic soda	50	7.0	Italy	Oronzio de Nora	Govora	1967	
	Chlorine	N.A.						
	Hydrochloric acid	N.A.						
	Carbon dioxide compressors	N.A.	0.2 (est.)	Austria	Andretz	N.A.	N.A.	Four units.

Table 10

Communist China: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) a/	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Chemical fibers and intermediates							
	Polyvinyl alcohol	4.0 (est.)	1.7	Japan	Kurashiki Rayon Company	Near Peking	N.A.	This plant, including a carbide furnace ($0.8 million), will provide raw material for a one-third increase in the output of a Japanese vinylon fiber plant built near Peking.
	Acrylonitrile	10	4.5	West Germany	Lurgi (Process from Oesterreichischen Stickstoffwerke AG, Austria)	Lan-chou	Fall 1967	
	Acrylic fiber	9.0 (est.)	8.5	United Kingdom	Prinex, Ltd., of Courtaulds, Ltd.	Lan-chou	Late 1967	
	Basic petrochemicals							
	N.A.	N.A.	1.3	Italy	SNAM-Progetti	Lan-chou	N.A.	The types of petrochemicals to be produced are unknown.
	Other chemicals							
	Air liquefaction	N.A.	3.3	West Germany	Lindes	T'ai-yuan	N.A.	Output will include oxygen, nitrogen, and rare gases such as argon.
	Methyl chloride	N.A.	3.0	Japan	N.A.	Possibly at Lo-yang	N.A.	Methyl chloride may be used for production of silicones.

a. Unless otherwise indicated.

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Table 10

Communist China: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66
(Continued)

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year) [a]	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Other chemicals (Continued)							
	Polyester resin and plastics extrusion	N.A.	0.4	United Kingdom	Scott Bader and Co., Ltd., and L.A. Mitchell, Ltd.	Ch'ang-chou	By mid-1967	The contract includes technology for reinforcing glass fibers with polyester resin.
	Rubber contraceptives	50 million units per year	0.2	Japan	Okamoto Rubber Industries Co.	N.A.	Fall 1966	
1966	Plastics and intermediates							
	Polyvinyl butyral resin film	1.2	0.6	Japan	Sekisui Chemical Co.	N.A.	Early 1967	The film is used as an interlayer for making safety glass.

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Table 11

North Korea: Contracts for the Purchase of Chemical Plants and Technology from the Free World
1965-66

Year	Type of Plant	Production Capacity (Thousand Metric Tons per Year)	Value (Million US $)	Exporter		Plant Site	Scheduled Completion Date	Comments
				Country	Firm			
1965	Other chemicals							
	Oxygen separation	N.A.	1.9	Japan	Toho Shokai	Aoji	N.A.	Probably part of the nitrogen fertilizer complex under construction at Aoji.
1966	Plastics and intermediates							
	Plasticizer	N.A.	0.2 (est.)	France	Speichim Usine de Melle	N.A.	N.A.	For possible use in the production of vinyl and synthetic resins.
	Agricultural chemicals							
	Urea	82.5	3.3	Netherlands	Continental Engineering	Hungnam	N.A.	An exact copy of a plant contracted for in 1964. The contract date is uncertain.

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